AMENDMENTS TO THE CLAIMS

Claims 1, 9, 16, 22, 25-28 have been amended. Claim 15 has been canceled. New claims 29-31 have been added. A listing of claims follows:

1. (Currently Amended) A loop extender adapted to be coupled to a local loop for improving transmission of downstream and upstream DSL signals over the local loop, the downstream DSL signals traversing the local loop in a downstream direction and having a downstream frequency band, and the upstream DSL signals traversing the local loop in an upstream direction and having an upstream frequency band, the loop extender comprising:

a first hybrid coupled to the local loop for receiving downstream DSL signals transmitted over the local loop~~, and for differentially amplifying upstream DSL signals, passing the differentially amplified upstream DSL signals to the local loop~~;

a downstream filter / amplifying equalizer coupled to the first hybrid for amplifying the downstream frequency band components of downstream DSL signals received by the first hybrid, and attenuating other components outside the downstream frequency band that may have leaked through the first hybrid ~~the upstream frequency band components of downstream DSL signals received by the first hybrid~~;

a differential amplifier pair coupled to the downstream filter / amplifying equalizer for further amplifying the downstream DSL downstream frequency band components~~signals attenuated and amplified by the downstream filter / amplifying equalizer~~; and

a second hybrid coupling the differential amplifier pair to the local loop, the second hybrid differentially amplifying the downstream frequency band components of downstream DSL signals ~~received from the differential amplifier pair~~ and passing the differentially amplified

downstream DSL signals to the local loop~~, and the second hybrid receiving upstream DSL signals transmitted over the local loop~~.

2. (Original) The loop extender of claim 1, further comprising:

an upstream filter / amplifying equalizer coupled to the second hybrid for amplifying the upstream frequency band components of upstream DSL signals received by the second hybrid, attenuating the downstream frequency band components of upstream DSL signals received by the second hybrid, and passing the attenuated and amplified upstream DSL signals to the first hybrid; and

an inverting amplifier coupled to the upstream filter / amplifying equalizer for inverting the attenuated and amplified upstream DSL signals amplified and passing the inverted upstream DSL signals to the first hybrid.

3. (Original) The loop extender of claim 1, wherein the downstream filter / amplifying equalizer is configured to amplify higher frequency components of the downstream frequency band of downstream DSL signals more than lower frequency components of the downstream frequency band of downstream DSL signals.

4. (Original) The loop extender of claim 2, wherein the upstream filter / amplifying equalizer is configured to amplify higher frequency components of the upstream frequency band of upstream DSL signals more than lower frequency components of the upstream frequency band of upstream DSL signals.

5. (Original) The loop extender of claim 1, further comprising POTS loading coils adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop.

6. (Original) The loop extender of claim 1, wherein the downstream and upstream DSL signals include VDSL signals.

7. (Original) The loop extender of claim 1, wherein the downstream and upstream DSL signals include Category I ADSL signals.

8. (Original) The loop extender of claim 2, wherein the downstream frequency band includes frequencies between about 150 kHz – 1.104 MHz and the upstream frequency band includes frequencies between about 25 – 120 kHz.

9. (Currently Amended) A device for amplifying DSL signals on a local loop, the DSL signals having a downstream frequency band and an upstream frequency band, the device comprising:

a downstream filter / amplifying equalizer coupled to the local loop for amplifying downstream frequency band DSL signals and for attenuating upstream frequency band DSL signals; ~~and~~

an upstream filter / amplifying equalizer coupled to the local loop for amplifying upstream frequency band DSL signals and for attenuating downstream frequency band DSL signals; and

a set of POTS loading coils adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop.

10. (Original) The device of claim 9, further comprising:

a differential amplifier pair coupled to the downstream filter / amplifying equalizer for further amplifying downstream frequency band DSL signals received from the downstream filter / amplifying equalizer; and

an inverting amplifier coupled to the upstream filter / amplifying equalizer for inverting upstream frequency band DSL signals received from the upstream filter / amplifying equalizer.

11. (Original) The device of claim 10, further comprising:

a first hybrid coupled to the downstream filter / amplifying equalizer, the inverting amplifier, and the upstream filter / amplifying equalizer for coupling the downstream filter / amplifying equalizer, the inverting amplifier, and the upstream filter / amplifying equalizer to the local loop; and

a second hybrid coupled to the upstream filter / amplifying equalizer and the differential amplifier pair for coupling the upstream filter / amplifying equalizer and the differential amplifier pair to the local loop.

12. (Original) The device of claim 11, wherein the first hybrid differentially amplifies the upstream frequency band DSL signals received from the inverting amplifier and the upstream filter / amplifying equalizer, and passes the differentially amplified upstream frequency band DSL signals to the local loop.

13. (Original) The device of claim 11, wherein the second hybrid differentially amplifies the downstream frequency band DSL signals received from the differential amplifier pair, and passes the differentially amplified downstream frequency band DSL signals to the local loop.

14. (Original) The device of claim 9, wherein the downstream filter / amplifying equalizer is configured to amplify higher frequency components of the downstream frequency band DSL signals more than lower frequency components of the downstream frequency band DSL signals, and the upstream filter / amplifying equalizer is configured to amplify higher frequency components of the upstream frequency band DSL signals more than lower frequency components of the upstream frequency band DSL signals.

15. (Canceled)

16. (Currently Amended) A loop extender adapted to be coupled to a local loop for improving DSL performance over the local loop, the loop extender comprising:

a first hybrid for receiving downstream DSL signals from a central office over the local loop;

a second hybrid for receiving upstream DSL signals from a customer premises over the local loop;

a downstream filter / amplifying equalizer coupled to the first hybrid for receiving downstream DSL signals from the first hybrid, and attenuating upstream frequency band components of downstream DSL signals and amplifying downstream frequency band components of downstream DSL signals;

a differential amplifier pair coupled to the downstream filter / amplifying equalizer for receiving attenuated and amplified downstream DSL signals from the downstream filter / amplifying equalizer and for further amplifying the downstream frequency band components of ~~attenuated and amplified~~ downstream DSL signals, the differential amplifier pair being coupled to the second hybrid;

an upstream filter / amplifying equalizer coupled to the second hybrid for receiving upstream DSL signals from the second hybrid, and attenuating downstream frequency band components of upstream DSL signals and amplifying upstream frequency band components of upstream DSL signals~~, the upstream filter / amplifying equalizer being coupled to the first hybrid~~; and

an inverting amplifier coupled to the upstream filter / amplifying equalizer for receiving attenuated and amplified upstream DSL signals from the upstream filter / amplifying equalizer and inverting the upstream frequency band components of the attenuated and amplified upstream DSL signals, the inverting amplifier being coupled to the upstream filter / amplifying equalizer and the first hybrid, and wherein the first hybrid differentially amplifies the upstream frequency band components received from the inverting amplifier, and passes the differentially amplified upstream DSL signals to the local loop.

17. (Original) The loop extender of claim 16, wherein:

the first hybrid is configured to differentially amplify the inverted upstream DSL signals received from the inverting amplifier and the attenuated and amplified upstream DSL signals received from the upstream filter / amplifying equalizer, and pass the differentially amplified upstream DSL signals to the local loop for transmission to the central office; and

the second hybrid is configured to differentially amplify the amplified downstream DSL signals received from the differential amplifier pair, and pass the differentially amplified downstream DSL signals to the local loop for transmission to the customer premises.

18. (Original) The loop extender of claim 16, further comprising POTS loading coils adapted to be coupled to the local loop for improving transmission of POTS band signals over the local loop.

19. (Original) The loop extender of claim 16, wherein the upstream and downstream DSL signals include ADSL signals.

20. (Original) The loop extender of claim 16, wherein the upstream and downstream DSL signals include VDSL signals.

21. (Original) The loop extender of claim 16, wherein the downstream filter / amplifying equalizer is configured to amplify higher frequency components of the downstream frequency band DSL signals more than lower frequency components of the downstream frequency band DSL signals, and the upstream filter / amplifying equalizer is configured to amplify higher frequency components of the upstream frequency band DSL signals more than lower frequency components of the upstream frequency band DSL signals.

22. (Currently Amended) A method for improving DSL service over a local loop, comprising:

coupling a first loop extender to the local loop between a central office and a customer premises; ~~and~~

improving transmission of POTS band signals over the local loop using a set of POTS loading coils within the first loop extender that are adapted to be coupled to the local loop; and

employing the first loop extender to differentially amplify upstream DSL signals passing over the local loop using a first hybrid and to differentially amplify downstream DSL signals passing over the local loop using a second hybrid, to at least partially compensate for DSL signal attenuation caused by the DSL signals passing over the local loop.

23. (Original) The method for improving DSL service over a local loop of claim 22, further comprising:

coupling a second loop extender to the local loop between the central office and a customer premises, the first and second loop extenders being disposed in series with each other and separated by a distance; and

employing the second loop extender to differentially amplify upstream and downstream DSL signals passing over the local loop to at least partially compensate for DSL signal attenuation caused by the DSL signals passing over the local loop.

24. (Original) The method for improving DSL service over a local loop of claim 23, wherein the distance between the first and second loop extenders is in the range 5,000 – 7,000 feet.

25. (Currently Amended) A method for improving DSL service over a local loop, comprising:

receiving an upstream DSL signal from a customer premises;

filtering the upstream DSL signal to attenuate signals outside an upstream DSL signal frequency band;

amplifying the filtered upstream DSL signal to at least partially compensate for upstream DSL signal attenuation caused by the upstream DSL signal passing over the local loop;

inverting the amplified upstream DSL signal using an inverting amplifier; and

differentially amplifying the amplified upstream DSL signal and the inverted amplified upstream DSL signal using a first hybrid to further compensate for upstream DSL signal attenuation caused by the upstream DSL signal passing over the local loop; and

passing the differentially amplified upstream DSL signal onto the local loop for transmission to a central office.

26. (Currently Amended) A system for improving DSL service over a local loop, comprising:

means for receiving an upstream DSL signal from a customer premises at a location along the local loop;

means for filtering the upstream DSL signal to attenuate signals outside an upstream DSL signal frequency band;

means for amplifying the filtered upstream DSL signal to at least partially compensate for upstream DSL signal attenuation caused by the upstream DSL signal passing over the local loop;

means for inverting the amplified upstream DSL signal using an inverting amplifier; and

means for differentially amplifying the amplified upstream DSL signal and the inverted amplified upstream DSL signal using a first hybrid to further compensate for upstream DSL signal attenuation caused by the upstream DSL signal passing over the local loop; and

means for passing the differentially amplified upstream DSL signal onto the local loop for transmission to a central office.

27. (Currently Amended) A method for improving DSL service over a local loop, comprising:

receiving a downstream DSL signal from a central office;

filtering the downstream DSL signal to attenuate signals outside a downstream DSL signal frequency band;

amplifying the filtered downstream DSL signal to at least partially compensate for downstream DSL signal attenuation caused by the downstream DSL signal passing over the local loop;

differentially amplifying the amplified downstream DSL signal to further compensate for downstream DSL signal attenuation caused by the downstream DSL signal passing over the local loop;

further differentially amplifying the differentially amplified downstream DSL signal to further compensate for downstream DSL signal attenuation caused by the downstream DSL signal passing over the local loop; and

passing the further differentially amplified downstream DSL signal onto the local loop for transmission to a customer premises, wherein a hybrid differentially amplifies the

differentially amplified downstream DSL signal, and passes the further differentially amplified downstream DSL signal to the local loop.

28. (Currently Amended) A system for improving DSL service over a local loop, comprising:

means for receiving a downstream DSL signal from a central office;

means for filtering the downstream DSL signal to attenuate signals outside a downstream DSL signal frequency band;

means for amplifying the filtered downstream DSL signal to at least partially compensate for downstream DSL signal attenuation caused by the downstream DSL signal passing over the local loop;

means for differentially amplifying the amplified downstream DSL signal to further compensate for downstream DSL signal attenuation caused by the downstream DSL signal passing over the local loop;

means for further differentially amplifying the differentially amplified downstream DSL signal to further compensate for downstream DSL signal attenuation caused by the downstream DSL signal passing over the local loop; and

means for passing the further differentially amplified downstream DSL signal onto the local loop for transmission to a customer premises, wherein a hybrid differentially amplifies the differentially amplified downstream DSL signal, and passes the further differentially amplified downstream DSL signal to the local loop.

29. (New) A device for amplifying DSL signals on a local loop, the DSL signals having a downstream frequency band and an upstream frequency band, the device comprising:

a downstream filter / amplifying equalizer coupled to the local loop for amplifying downstream frequency band DSL signals and for attenuating upstream frequency band DSL signals;

an upstream filter / amplifying equalizer coupled to the local loop for amplifying upstream frequency band DSL signals and for attenuating downstream frequency band DSL signals;

a differential amplifier pair coupled to the downstream filter / amplifying equalizer for further amplifying downstream frequency band DSL signals received from the downstream filter / amplifying equalizer;

an inverting amplifier coupled to the upstream filter / amplifying equalizer for inverting upstream frequency band DSL signals received from the upstream filter / amplifying equalizer;

a first hybrid coupled to the downstream filter / amplifying equalizer, the inverting amplifier, and the upstream filter / amplifying equalizer for coupling the downstream filter / amplifying equalizer, the inverting amplifier, and the upstream filter / amplifying equalizer to the local loop, wherein the first hybrid differentially amplifies the upstream frequency band DSL signals received from the inverting amplifier and the upstream filter / amplifying equalizer, and passes the differentially amplified upstream frequency band DSL signals to the local loop; and

a second hybrid coupled to the upstream filter / amplifying equalizer and the differential amplifier pair for coupling the upstream filter / amplifying equalizer and the differential amplifier pair to the local loop.

30. (New) A device for amplifying DSL signals on a local loop, the DSL signals having a downstream frequency band and an upstream frequency band, the device comprising:

a downstream filter / amplifying equalizer coupled to the local loop for amplifying downstream frequency band DSL signals and for attenuating upstream frequency band DSL signals;

an upstream filter / amplifying equalizer coupled to the local loop for amplifying upstream frequency band DSL signals and for attenuating downstream frequency band DSL signals;

a differential amplifier pair coupled to the downstream filter / amplifying equalizer for further amplifying downstream frequency band DSL signals received from the downstream filter / amplifying equalizer;

an inverting amplifier coupled to the upstream filter / amplifying equalizer for inverting upstream frequency band DSL signals received from the upstream filter / amplifying equalizer;

a first hybrid coupled to the downstream filter / amplifying equalizer, the inverting amplifier, and the upstream filter / amplifying equalizer for coupling the downstream filter / amplifying equalizer, the inverting amplifier, and the upstream filter / amplifying equalizer to the local loop; and

a second hybrid coupled to the upstream filter / amplifying equalizer and the differential amplifier pair for coupling the upstream filter / amplifying equalizer and the differential amplifier pair to the local loop, wherein the second hybrid differentially amplifies the downstream frequency band DSL signals received from the differential amplifier pair, and passes the differentially amplified downstream frequency band DSL signals to the local loop.

31. (New) A method, comprising:

amplifying, on a local loop, DSL signals having a downstream frequency band and an upstream frequency band by,

amplifying downstream frequency band DSL signals using a downstream filter/amplifying equalizer and amplifying upstream frequency band DSL signals using an upstream filter/amplifying equalizer,

attenuating upstream frequency band DSL signals using the downstream filter/amplifying equalizer and attenuating upstream frequency band DSL signals using the upstream filter/amplifying equalizer, and

improving transmission of POTS band signals over the local loop using a set of POTS loading coils adapted to be coupled to the local loop.